

# 2013 UDOT RESEARCH PROBLEM STATEMENT

\*\*\* Problem statement deadline is March 25, 2013. Submit statements to Steve Bagley at [sbagley@utah.gov](mailto:sbagley@utah.gov) \*\*\*

**Problem Title:** Development of Performance Matrices for Evaluating Innovative Intersections and Interchanges **No. UT-13.03.16**

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**Select a Subject Area**

☐ Materials/Pavements

☐ Maintenance

☒ Traffic Mgmt/Safety

☐ Geotechnical

☐ Preconstruction

☐ Planning/Asset Mgmt

☐ Transportation Innovation

## 1. Describe the problem to be addressed.

Innovative intersections and interchanges, primarily Continuous Flow Intersection (CFI) and Diverging Diamond Interchange (DDI), have seen an increase in numbers in the State over the past several years, making Utah a leader in the country in implementation of these designs. Although on the surface these designs seem to improve traffic performance, their complete impacts and benefits are hard to assess. There are no clearly defined guidelines and methodologies for monitoring and measuring performance of these designs from state DOTs manuals, AASHTO, HCM, NEMA and HSM. Innovative designs have impacts on safety, accessibility, transit, pedestrian and non-motorized traffic, land use, economic development, and environment, making them an excellent candidate for an in-depth analysis of different benefit-impact combinations. There is no a defined straightforward way for this analysis. This study proposes to review the existing methodologies implemented by researchers and agencies, and develop a set of performance matrices for evaluation of innovative designs, that would help UDOT define guidelines and methodologies for existing and future implementations.

## 2. Describe why this research is important and how it is unique.

UDOT has already taken the lead in the country in implementing innovative intersections/interchanges. It can be expected that these implementation will continue in the future, since these innovative solutions seem to be able to alleviate some of the congestion problems on busiest intersections and interchanges. However, there are still no clearly defined guidelines and methodologies for their performance and safety evaluation. Researchers and practitioners have recognized that there are gaps when it comes to innovative solutions, so it can be expected that research in this area will increase in the next several years. This research will help make UDOT also a leader in researching innovative designs, along with their implementations. There are a lot of unknown aspects, especially when it comes to evaluating innovative solutions. This research will help identify and develop the best methodologies for an in-depth analysis of different benefit and impact of innovative solutions on the traveling public and surrounding communities.

## 3. List the research objective(s) to be accomplished:

1. Review the existing implementations, geometric and signal control designs, standards and guidelines for innovative intersections and interchanges
2. Review the existing methodologies for performance and safety evaluation of these designs

3. Define the needs for guidelines and methodologies for evaluation of innovative solutions
4. Develop and recommend performance matrices and evaluation guidelines to be used by UDOT on existing and future projects
5. Summarize all findings and recommendations

#### **4. List the major tasks to accomplish the research objective(s):**

1. Literature review of implementations, designs and evaluations of innovative intersections and interchanges
2. Review of existing methodologies for performance and safety evaluation of these designs
3. Review of existing standards and guidelines (including, but not limited to AASHTO, HCM, MUTCD, NEMA, HSM, state DOTs design manuals) for guidelines and methodologies that could be implemented with innovative intersections and interchanges
4. Identifying gaps in the existing guidelines and methodologies
5. Identifying potential methodologies that could fill in gaps from 4.
6. Meet with UDOT to review findings 1 – 5 and identify the best candidate methodologies
7. Development and recommendations of performance matrices and evaluation methodologies for innovative intersections and interchanges that could be implemented in current and future UDOT's projects

#### **5. List the deliverable(s) to come to UDOT from this research study:**

1. Literature review of implementations, designs and evaluations of innovative intersections and interchanges, as well as existing standards, guidelines and methodologies
2. A set of performance matrices for evaluation of innovative intersections and interchanges
3. Final report with all analyses, methodologies and recommendations

**6. Describe how the results of this study will be implemented at UDOT.**

The results of this study would help UDOT make better and more informed decisions about the implementation, and performance and safety evaluations of innovative solutions. Each implementation is unique, and there are a lot of parameters that have to be considered before, during and after the implementation. The evaluation has to encompass all aspects of performance, from general MOEs to impacts on safety, accessibility, transit, pedestrian and non-motorized traffic, land use, economic development, and environment. This research is expected to deliver a set of straightforward performance matrices and methodologies for these evaluations.

The University of Utah will apply for matching funds from the Mountain Plains Consortium (MPC), a University Transportation Center, and if the funds are approved, the researchers will work with the UDOT TAC to develop an additional scope that would supplement the work presented in this proposal.

**7. Estimated cost - Total:** \$70,000.00

**UDOT Share:** \$35,000.00

**Other/Matching Funds:** \$35,000.00

**8. Outline the proposed schedule for this study, including estimated start date, duration, and major event dates.**

The estimated duration of this project is 12 months, with a recommended start date in August 2013, and end date in August 2014.

The project would have three general phases:

Phase I (duration: 4 months): Review of existing performance evaluation methodologies

Phase II (duration: 4 months): Development of potential performance and safety evaluation methodologies, and creating performance matrices for innovative designs

Phase III (duration: 4 months): Additional reviews and analyses, and writing the final report

Phases I and II would produce Interim reports for UDOT's review and suggestions, which would be implemented in the Final report.